

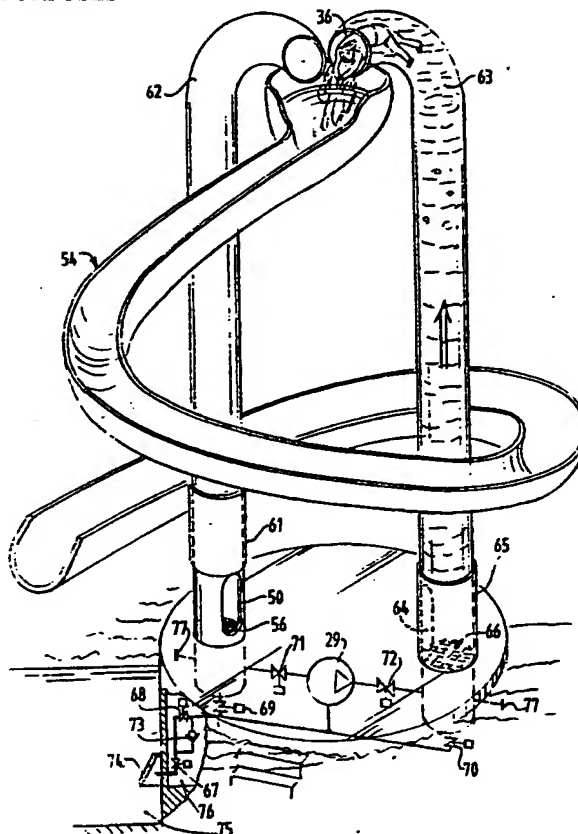


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(54) Title: SWIMMING POOL SYSTEM FOR RECREATIVE PURPOSES**(57) Abstract**

Recreational device for a swimming pool, comprising a water conductor (1, 19, 37, 48, 62, 63), extending partially above the water surface (2) of the swimming pool in which a person (36) can be moved, having pressure means (5, 29) to force water in the water conductor (1, 19, 37, 48, 62, 63) in an upward direction.



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Any designation of "SU" has effect in the Russian Federation. It is not yet known whether any such designation has effect in other States of the former Soviet Union.

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SWIMMING POOL SYSTEM FOR RECREATIVE PURPOSES

The invention relates to a swimming pool system for recreational purposes comprising

a water guide extending at least partially above the level of the water surface of this swimming pool and in which a person can move.

Such a system is known, for instance from the American patent specification US-A-4 805 897.

The known recreational swimming pool system comprises a water slide from an elevated platform to a pool. Water is carried by means of a pump system to the start of the water slide on the platform so that a person can allow himself to be carried in and by the water over the water slide to the pool located thereunder. The known system does not offer a person the option of being propelled forward in the water guide in upward direction.

The object of the invention is to provide a swimming pool system for recreational purposes which offers a person the option of allowing himself to be moved in a water guide in upward direction.

This object is achieved according to the invention with a swimming pool system characterized by pushing means for pushing water in the water guide in upward direction.

In a system with a water guide according to the invention it is possible for a person to move himself in upward direction in the water guide either by actively swimming upward in upwardly pushed water or by allowing himself to be carried along passively by water being pushed in upward direction in the water guide.

In a first embodiment of a system according to the invention the water guide comprises a holder rising out of the

surface of the water and closed at the top and open at the bottom, and the pushing means comprise a pumping device connected to the upper part of the holder.

When the air pressure in such a holder is decreased using
5 the pumping device, the water level therein rises relative to the water surface outside the holder. When the holder is sufficiently high and the water therein is pumped to a sufficiently high level, it is possible for a swimmer to swim upward in the holder via the open underside to a level
10 protruding above the level of the surrounding water surface.

In another embodiment the water guide comprises a curved tube whereof the entrance is situated under a first water surface and the exit under a second water surface.

The pushing means for pushing the water upward in such a
15 curved tube comprise for instance a pumping device connected to the highest part of the tube.

The dimensions of such a curved tube can be selected such that a part of the tube is elevated wholly above the surface of the water. A swimmer moving through the tube from the entrance
20 to the exit will be swimming at a certain point at a height located above the water surface of the swimming pool. The curved tube can for instance be used as bridge over a division between two pools. It is not necessary for these pools to function as communicating vessels.

25 In an exceptional embodiment of a water guide with a curved tube the first water surface lies at a higher level than the second water surface.

When the entrance to a curved tube according to the invention lies below a first water surface having a higher level
30 than the second water surface, beneath which the exit is located, the curved tube functions, once it is filled, as a syphon. A swimmer can then allow himself to be carried along by the flow in the tube generated by the syphon action from a pool at a determined water level to a pool having a water surface at
35 a lower level.

Special effects can be realized in a tube when swimming through a tube by using injecting means for injecting water into the tube.

By injecting water into a tube the flow in the tube can be accelerated, which certainly increases the recreative and attraction value of the system.

In one embodiment the injecting means according to the invention comprise at least one opening in the wall of the tube for feeding water into the tube.

The tube preferably comprises at least one band of openings distributed around the periphery of the tube wall.

In a tube into which water is injected via a number of openings distributed round the periphery of the tube wall a swimmer in the tube is as it were repelled from the wall of the tube, which can certainly offer advantages from a safety viewpoint when the water is flowing more rapidly in the tube.

The pushing up of the water in upward direction in the tube can also be effected using the means for injecting water into the tube. In a tube which connects two pools with different water levels injecting means can be employed to start the syphoning action of the tube and to subsequently increase the flow speed of the water.

In a tube provided with openings for injecting water and in which a flow is generated and maintained, the openings according to the invention preferably lie at an angle of slope relative to the tube wall such that supplied water is injected in the direction of the exit to the tube.

Depending inter alia on the position of the openings and the value of the angle of slope, a suction action will occur in such a tube as a consequence of a venturi effect by the injected water, as a result of which the water is supplied more easily to the entrance of the tube.

A preferred embodiment of a system with a curved tube which is used under conditions wherein water flows through the tube from the entrance to the exit is characterized by a pipe

for return transport of water from the exit to the entrance of the tube.

This latter system preferably comprises a return pipe which connects the exit of the tube to the entrance thereof via a number of openings distributed in the tube wall around the exit and around the entrance, in which return pipe are received pumping means. A curved tube with a return pipe offers many advantages. A part of the water flowing through the tube is circulated due to the presence of the return pipe. The safety of the system is increased with a return pipe because flow and turbulence phenomena round the entrance to the tube are reduced. When the tube connects two water surfaces of the same level, pump circulation is to be preferred for reasons of energy since the water in the return pipe is supplied to the pumping device under a determined (hydrostatic) pressure. When the tube connects two pools at different levels a return pipe with pumping device contributes towards maintaining the level difference required for the syphoning action.

The safety of a system is increased according to the invention by a closable air inlet in the highest part of the system.

In normal conditions the air inlet is closed and in particular conditions the air inlet can be opened, as a result of which the hydrostatic pressure maintaining the water level in the water guide falls away. As a consequence the water level in the water guide will fall abruptly.

For reasons of safety operating means for the air inlet are preferably available in the interior of the system.

Yet another embodiment of a system according to the invention is characterized by control means for maintaining the pressure in an enclosed quantity of air in the highest part of the system above a predetermined value.

The minimum value of the air pressure in the highest part of the system will of course determine the maximum value of the height of the water carried up in the water guide. The dimensions of the water guide can be defined such that the

vacuum required to maintain the water column in the water guide is still sufficiently high for a swimmer to remain for a longer period in the highest part of the system. The oxygen content of the enclosed quantity of air is then kept up to standard by
5 blowing in fresh air, the pressure of which is kept constant using the control means.

Still another embodiment of a system according to the invention has the feature that the water guide comprises a tube rising from the water surface at a determined angle of slope and
10 open at the bottom and top, the tube wall of which comprises at least one opening in peripheral direction on the underside for supplying water under pressure to the tube with pumping means, wherein the opening lies at an angle of slope relative to the tube wall such that supplied water is injected in the direction
15 of the exit to the tube.

The water guide in this latter system offers the swimmer the option of being carried along by the water at the bottom of the tube and being ejected at the top above the water surface of the swimming pool in which the swimmer will again automatically
20 land.

In preference this latter system comprises a return pipe from the top side of the tube to the pumping means. With such a return pipe the amount of energy required for the system is reduced, while the safety of the system is increased due to
25 restraining of flow and turbulence phenomena in the water round the underside of the pipe.

In yet another embodiment the water guide comprises at least one vertical hollow pillar, which pillar is provided on the underside with a swimmer entrance closable to water, the
30 pushing means comprise a pumping device connected to the lowest portion of the pillar and the system comprises at the top receiving means for a person carried along by water in the pillar.

The receiving means comprise for example a closable
35 swimmers' exit in the upper part of the pillar, which exit provides access to a pool.

When a person has entered the initially empty pillar and has closed the entrance, water is pushed upward into the pillar by the pumping device to a determined height, whereafter the pumping device is switched off and/or an excess of water is discharged via an overflow. The person is carried along by the rising water flow and is received at the top of the pillar, for instance in the pool accessible via the exit. When the exit is closed again the water is allowed to run out of the pillar, whereafter the entrance is re-opened and the cycle can be repeated with a following person.

In a particularly favourable embodiment the number of pillars amounts to at least two, which pillars each comprise on the underside a discharge pipe which is connected to the pumping device such that water pushed up into a particular pillar is drained via the discharge pipe and pushed up into the other pillar by the pumping device.

In this preferred embodiment energy and water are saved by making use each time in the filling of a pillar of the water and the static pressure thereof in the other pillar.

In the above described embodiments a person is taken up directly in the water in the pillar.

In an alternative embodiment the system comprises a platform movable in the pillar and floating on water.

In such a pillar a person assumes position on the platform and is then carried upward by the platform pushed up by the water.

When the buoyancy of the platform with a person in position thereon can be made adjustable it is possible to push a person upward on the platform enveloped by water to a greater or lesser extent.

A controllable buoyancy is brought about with a platform comprising a closable opening and a downward extending peripheral edge.

Closing the opening at an earlier or later stage in the initial phase of the filling of the pillar with water will result in a greater or smaller quantity of air in the space

formed by the platform, the peripheral edge and the water surface and therefore a greater or smaller buoyancy of the platform with the person standing thereon. The attraction and recreational value of a platform with controllable buoyancy is increased further when the opening is formed such that it can be closed with the foot of a person standing thereon.

The attraction value is increased still more with a per se known water slide extending from the top of the pillar.

In order to heighten for instance visual and physical stimuli, to increase flow speeds or to replace water in the water guide or a quantity of air enclosed therein, the system comprises in a number of embodiments supply means for air to the water in the water guide.

Per se known materials for swimming pool systems for recreative purposes can be used as material for a system according to the invention. To increase the attraction and recreational value a system consists according to the invention at least partially of transparent material.

The invention will now be elucidated hereinafter in the light of embodiments not limiting the invention and with reference to the drawing.

Figure 1 shows a holder rising from the water surface which is closed at the top and open at the bottom;

figure 2 shows a tubular guide the entrance and exit of which are placed under two water surfaces of different level;

figure 3 shows a tubular guide with a return pipe;

figure 4 shows a tube open at the top and bottom which rises from the water surface at an inclined angle;

figure 5 shows a vertical hollow pillar with entrance and exit for a person and a pool at the top of the pillar; and

figure 6 shows a system comprising two vertical hollow pillars, a pool and a water slide.

Figure 1 shows in cut-away perspective a holder 1 open at the top and bottom which rises from a water surface 2. The holder is supported by a column 3 which rests on the bottom 4 of a swimming pool. Using a vacuum pump 5 a vacuum is created in

the upper part 8 of the interior of the holder 1 via a pump line 6, a closing valve 16 and openings 7. As a consequence of the pumping action water rises into the holder to a water level 10. By means of an air pipe 12 with closing valve 11 and an opening 17 debouching below the water surface 2 fresh air is added to the water in the holder and thereby to the upper part of the holder. To prevent additives such as for instance chlorine that may have been added to the swimming pool water being carried along by the air escaping from opening 17 and accumulating in the upper part 8 of holder 1, air can, by way of alternative or by way of addition, also be supplied via an opening 15 in the upper side 18 of the holder 1. The quantity of air supplied via the openings 15 and/or 17 is limited by a control system (not shown) in a manner compatible with the power and operation of vacuum pump 5. Air can be admitted very rapidly into holder 1 as the situation requires by opening closing valve 13 and simultaneously closing closing valve 16, as a result of which the water level 10 will fall to the level of the water surface 2. By closing and opening the closing valves 13 and 16 respectively the water in the holder will rise again. A swimmer can swim under the edge 14 up into the holder 2. The wall and the upper part of the holder are preferably manufactured from transparent material, which considerably increases the attraction value of the system both for swimmers and spectators. In order to increase convenience and safety the column 3 can further be provided in known manner with an edge at the bottom on which a swimmer can stand, an edge at the top on which a swimmer can grip fast and with an ergonomically formed handle with which, in the manner of a "communication cord" the closing valve 13 can be opened.

Figure 2 shows in cut-away perspective view a curved tube according to the invention with entrance 20 and exit 21 in a swimming pool 22 which is divided by a partition wall 23 into a pool with a first 24 water surface and a lower lying second 25 water surface. Via a connection 27, a pump line 6 and a closing valve 16 air is extracted using a vacuum pump 5 from a chamber

28 which is formed by a widened portion of the tube 19. Under the influence of the pumping action water rises via the entrance 20 into the tube 19 until the moment that the tube 19 begins to act as a syphon and the flow in the tube is maintained as a result of the level difference between the water surfaces 24 and 25. The height of the water level 10 in the chamber 28 is dependent on the air pressure above the water surface 10. As discussed above with reference to figure 1, the air in chamber 28 above water surface 10 can be replaced regularly at a constantly maintained pressure using supply and control systems so that swimmers moving via tube 19 from the higher to the lower part of the swimming pool 22 can take a break in chamber 28 and, if the chamber is made of transparent material, enjoy the view. Using a return pipe 30 provided with a water pump 29 and protected by gratings 31 the level difference between both parts of the swimming pool can be maintained.

Figure 3 shows a curved tube 19 of which the entrance 20 and the exit 21 lie below the same water surface 2. The tube is provided with a return pipe 30 in which a water pump 29 is received. The return pipe 30 is connected to connecting pieces 34 and 35 which form a chamber around the tube wall close to the entrance 20 and exit 21 respectively of the tube 19. Injecting into and extraction from the tube 19 of water takes place via openings 34 and 35 respectively in the portions of the tube wall enclosed by the respective connecting pieces 32 and 33. The openings 34 arranged in a band around tube 19 lie at a sloping angle relative to the tube wall such that supplied water is injected in the direction of the exit 21 of the tube. Thus achieved is that the water injected via the openings 34 leaves the tube 19 not via the entrance 20 but via the exit 21 or via the openings 35. Water jets injected via thus formed openings 34 moreover exert as a result of a venturi effect a suction action on water from the swimming pool supplied via the opening 20. Because a great part of the water flow through tube 19 is carried through the return pipe 30 via the openings 34 using the pump 29, the flow at the location of opening 20 is comparatively

small and there is little turbulence there, so that a swimmer 36 swims into the entrance in relatively calm conditions and is only subjected to a considerable acceleration of the water flow through the tube 19 at the position of the openings 34.

5 Figure 4 shows schematically an open tube 37 rising at an incline from a water surface 2, the entrance 20 to which is situated below the water surface 2 and the exit 21 thereabove. The tube is suspended in a yoke 38 fixed on a foot 39 resting on the bottom 4 of the swimming pool. The tube 37 is interrupted in
10 peripheral direction by a slot 40 running according to a cone surface, on either side of which the tube is held together via seals 42 by a collar 41 in peripheral direction. The collar 41 comprises a recess 43 in peripheral direction on either side of the slot 40 into which recess debouches an inlet 44. Water is
15 injected into the tube 37 in the direction of the exit 21 via the inlet 44, the annular recess 43 and the annular slot 40. Due to the venturi effect occurring at the point of the outlet of the slot 40 in tube 37 water is drawn in from the swimming pool via the entrance 20, as a result of which a water flow leaves
20 the exit 21 that has a sufficient output to push a swimmer via the entrance 20 up the tube 37 and to eject him via the exit 21 at an appropriate speed. The angle of the tube 37 to the water surface and the height of tube 37 can be varied as can be seen from the schematically shown suspension of the tube 37 by means
25 of a screw shaft 45 displaceable in a vertical slot 47 and connected to the collar 41, which shaft is fixed in place by a nut 46.

Figure 5 shows a hollow tube 48 disposed vertically on a bottom 49 and having a swimmer entrance 50 on the underside
30 thereof. Using a water pump 29 water is supplied via a feed pipe 51 to the tube 48 when a person (not shown) has taken up position therein and the entrance 50 is closed. The tube 48 is provided at the top with a closable swimmer exit 52 which provides access to a pool 53. The elevated pool 53 forms the
35 starting point of a water slide 54 which runs out for instance above the water surface 2 of a second pool adjoining the foot of

the tube 48. The closable swimmer entrance 52 is for instance designed such that it can only be opened when the water level in tube 48 equals the level 55 of the water in pool 53. According to the invention a person can be pushed upward directly by the water in tube 48 without other assist means. The drawing shows another alternative option wherein a person takes up position on a platform 57 which rests on a grating 56 and which is provided with a peripheral edge 58 and a channel 59 closable with the foot. When water is carried into tube 48 by pump 29 via feed pipe 51 this water slowly fills the space enclosed by the platform 57 and the downward extending peripheral edge 58 thereof. Closing of the channel 59 in good time creates an air chamber 60 on the underside of platform 57, the volume of which is determined by the moment of closing of the channel 59. By thus controlling the volume of the air chamber 60 the buoyancy of the combination of the platform and a person who has taken up position thereon is also controlled. The person is thus pushed upward enveloped in a greater or smaller amount of water determined by himself. The drawing finally shows a sleeve 61 concentric to the tube 48 and displaceable vertically therealong with which the entrance 50 can be closed.

Figure 6 shows a system according to the invention with two hollow tubes 62, 63 wherein a person can be pushed upward by water. The rise tubes 62, 63 are disposed vertically on a bottom 49 adjacent to a pool 75. Located under the rise tubes is a cellar 76 in which is arranged a water pump 29. Rise tubes 62 and 63 debouch at the top above the high position of the starting point of a known zigzag water slide 54. Situated in the rise tubes 62 and 63 are gratings 56 and 66 on which a person for transporting in the tube can take up position via the respective entrances 50 and 64. The entrances 50 and 64 can be closed by vertically displaceable sleeves 61 and 65 respectively. Water can be fed to the rise tubes 62, 63 via a pipe system in which are incorporated a water pump 29 and the valves 67, 68, 69, 70, 71 and 72 for remote opening and closing, in addition to a non-return valve 73 closing in the direction of

the apex point. A compressed air line can be connected onto the connecting points 77. The operation of the system can be described as follows: Water is drawn from the pool 75 from behind grating 74 with pump 29 via non-return valve 73 and the valve 67, which is open under normal conditions, and pressed via valve 72 into the rise tube 63. If a person has assumed position on grating 66 he is carried along upward by the water flow and dropped into slide 54 which debouches above the pool 75. A following person can meanwhile have taken up position on grating 56 in tube 62, with the entrance 50 then being closed by sleeve 61. Valve 72 is then closed, valve 70 and 71 are successively opened and the second person also pushed upward. The tube 63 is then available again. In this manner use is made of both the static pressure in an emptying tube and the action of pump 29.

When circumstances require the rise tubes 62 and 63 can be quickly emptied into pool 75 via the valves 69 and 70 and the closing valves 68 and 67.

CLAIMS

1. Swimming pool system for recreative purposes comprising

a water guide extending at least partially above the level of the water surface of this swimming pool and in which a
5 person can move,

characterized by pushing means for pushing water in the water guide in upward direction.

2. System as claimed in claim 1, characterized in that the water guide comprises a holder rising from the surface of
10 the water and closed at the top and open at the bottom, and the pushing means comprise a pumping device connected to the top side of the holder.

3. System as claimed in claim 1, characterized in that the water guide comprises a curved tube whereof the entrance is
15 situated under a first water surface and the exit under a second water surface.

4. System as claimed in claim 3, characterized in that the pushing means comprise a pumping device connected to the highest part of the tube.

20 5. System as claimed in claim 3 or 4, characterized in that the first water surface lies at a higher level than the second water surface.

6. System as claimed in any of the claims 3-5, characterized by injecting means for injecting water into the
25 tube.

7. System as claimed in claim 6, characterized in that the injecting means comprise at least one opening in the wall of the tube for feeding water into the tube.

8. System as claimed in claim 7, characterized by a
30 number of openings distributed round the periphery of the tube wall.

9. System as claimed in claim 7 or 8, characterized in that the openings lie at an angle of slope relative to the tube wall such that supplied water is injected in the direction of the exit to the tube.

5 10. System as claimed in any of the claims 6-9, characterized by a pipe for return transport of water from the exit to the entrance of the tube.

10 11. System as claimed in claim 10, characterized by a return pipe which connects the exit of the tube to the entrance thereof via numbers of openings distributed in the tube wall around the exit and around the entrance, and by pumping means in the return pipe.

15 12. System as claimed in any of the claims 1-11, characterized by a closable air inlet in the highest part of the system.

13. System as claimed in claim 12, characterized by operating means for the air inlet present in the interior of the system.

20 14. System as claimed in claim 2 or 3, characterized by control means for maintaining the pressure in an enclosed quantity of air in the highest part of the system above a predetermined value.

25 15. System as claimed in claim 1, characterized in that the water guide comprises a tube rising from the water surface at a determined angle of slope and open at the bottom and top, the tube wall of which comprises at least one opening in peripheral direction on the underside for supplying water under pressure to the tube with pumping means, wherein the opening lies at an angle of slope relative to the tube wall such that
30 supplied water is injected in the direction of the exit to the tube.

16. System as claimed in claim 15, characterized by a return pipe from the top side of the tube to the pumping means.

35 17. System as claimed in claim 1, characterized in that the water guide comprises at least one vertical hollow pillar,

which pillar is provided on the underside with a swimmer entrance closable to water,

the pushing means comprise a pumping device connected to the lowest portion of the pillar

5 and the system comprises at the top receiving means for a person carried along by water in the pillar.

18. System as claimed in claim 17, characterized by a closable swimmer exit in the upper part of the pillar, which exit provides access to a pool.

10 19. System as claimed in claim 17 or 18, characterized in that the number of pillars amounts to at least two, which pillars each comprise on the underside a discharge pipe which is connected to the pumping device such that water pushed up into a particular pillar is drained via the discharge pipe and pushed
15 up into the other pillar by the pumping device.

20. System as claimed in any of the claims 17-19, characterized by a platform movable in the pillar and floating on water.

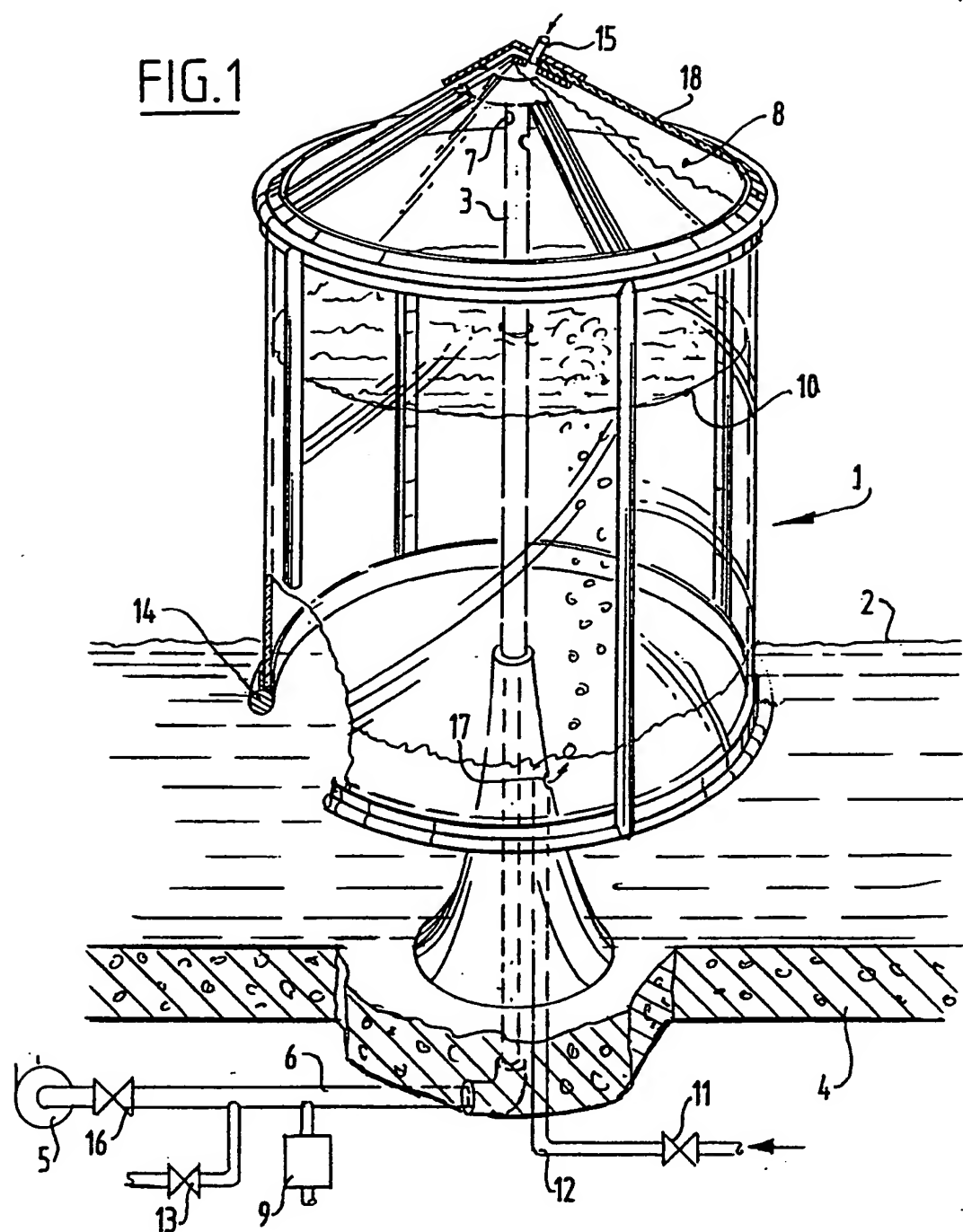
21. System as claimed in claim 20, characterized in that
20 the platform comprises a closable opening and a downward extending peripheral edge.

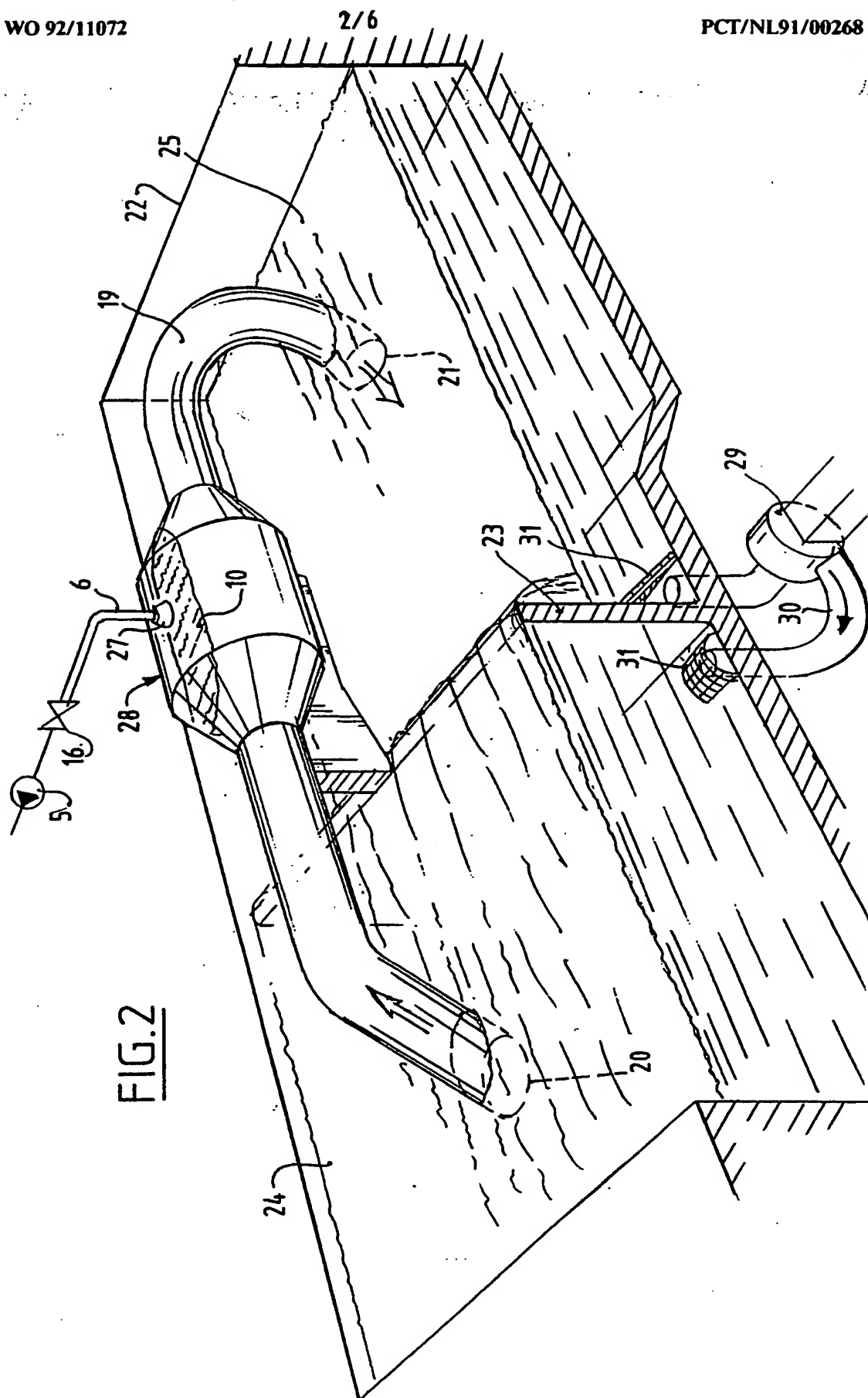
22. System as claimed in any of the claims 17-21, characterized by a water slide extending from the upper part of the pillar.

25 23. System as claimed in any of the claims 1-22, characterized by supply means for air to water in the water guide.

24. System as claimed in any of the claims 1-23, characterized in that the system consists at least partially of
30 transparent material.

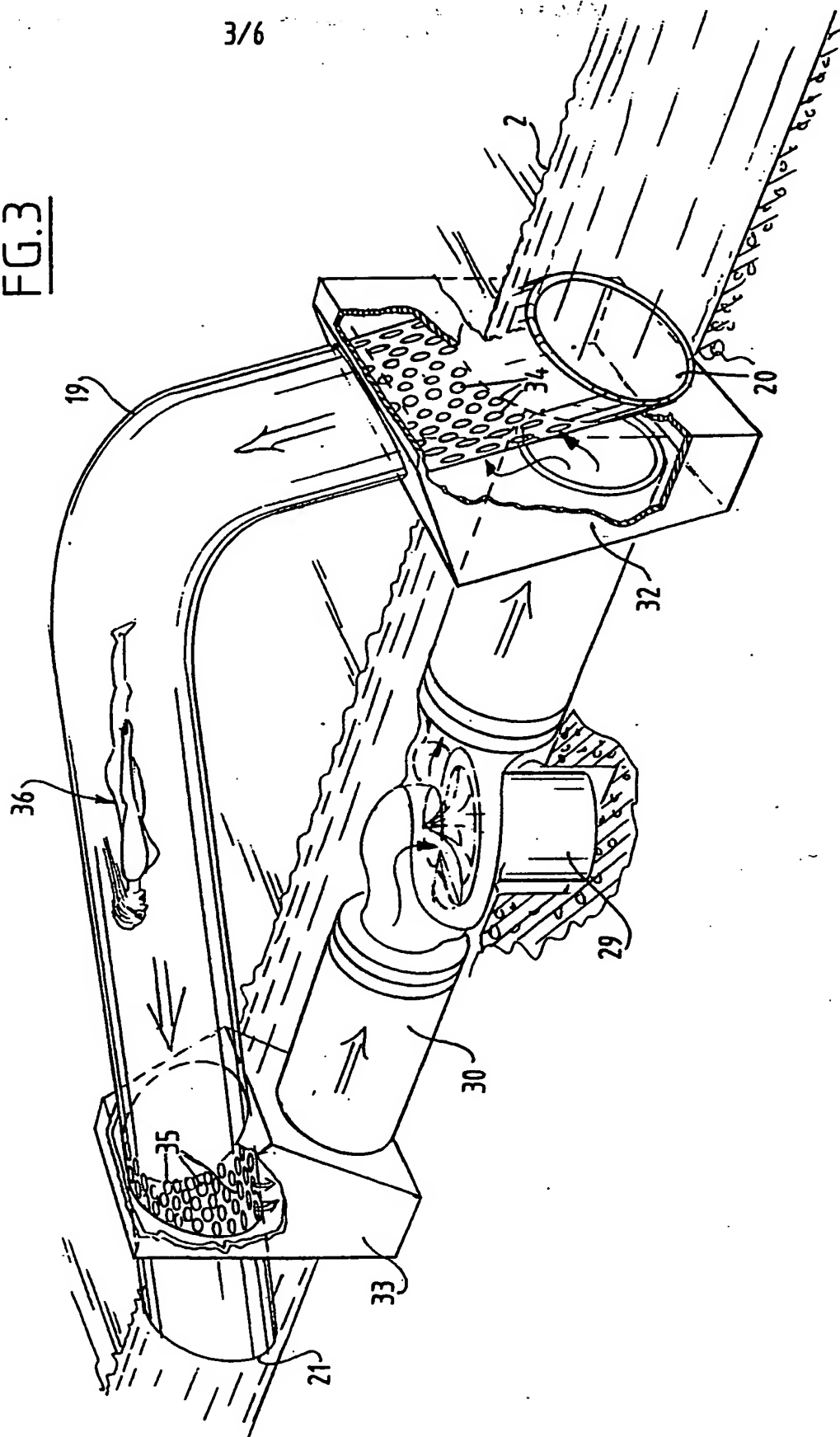
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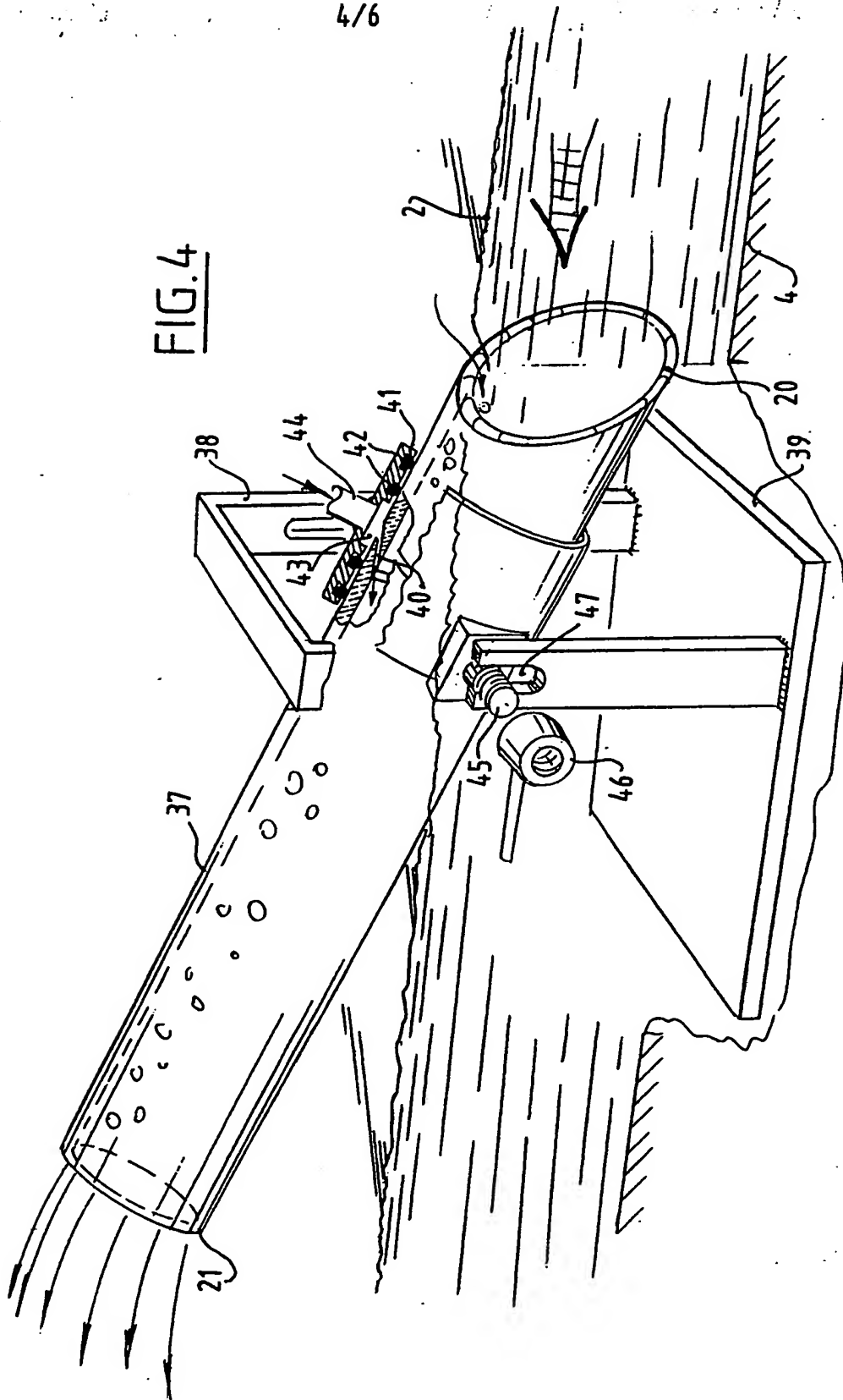
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FIG. 3

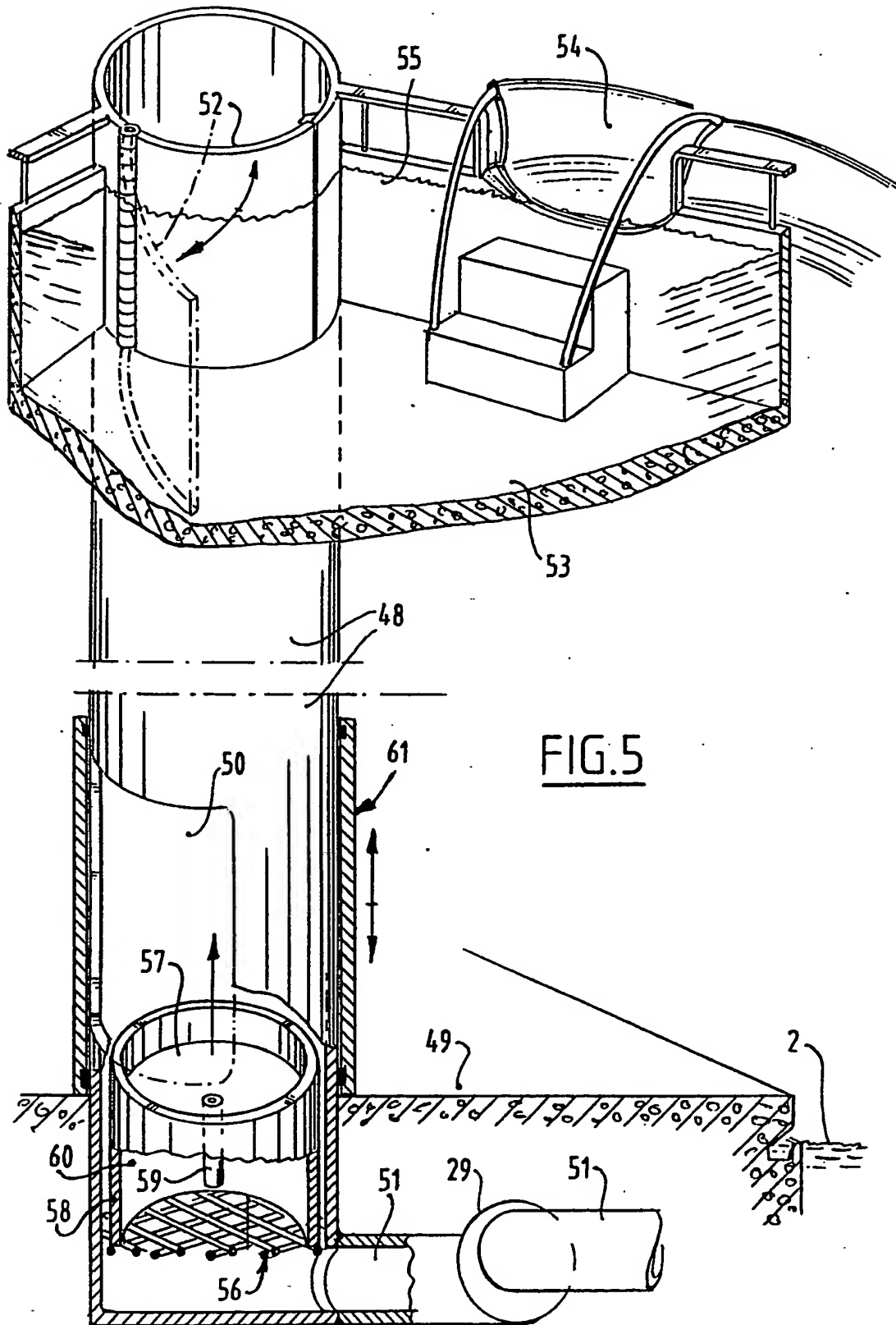


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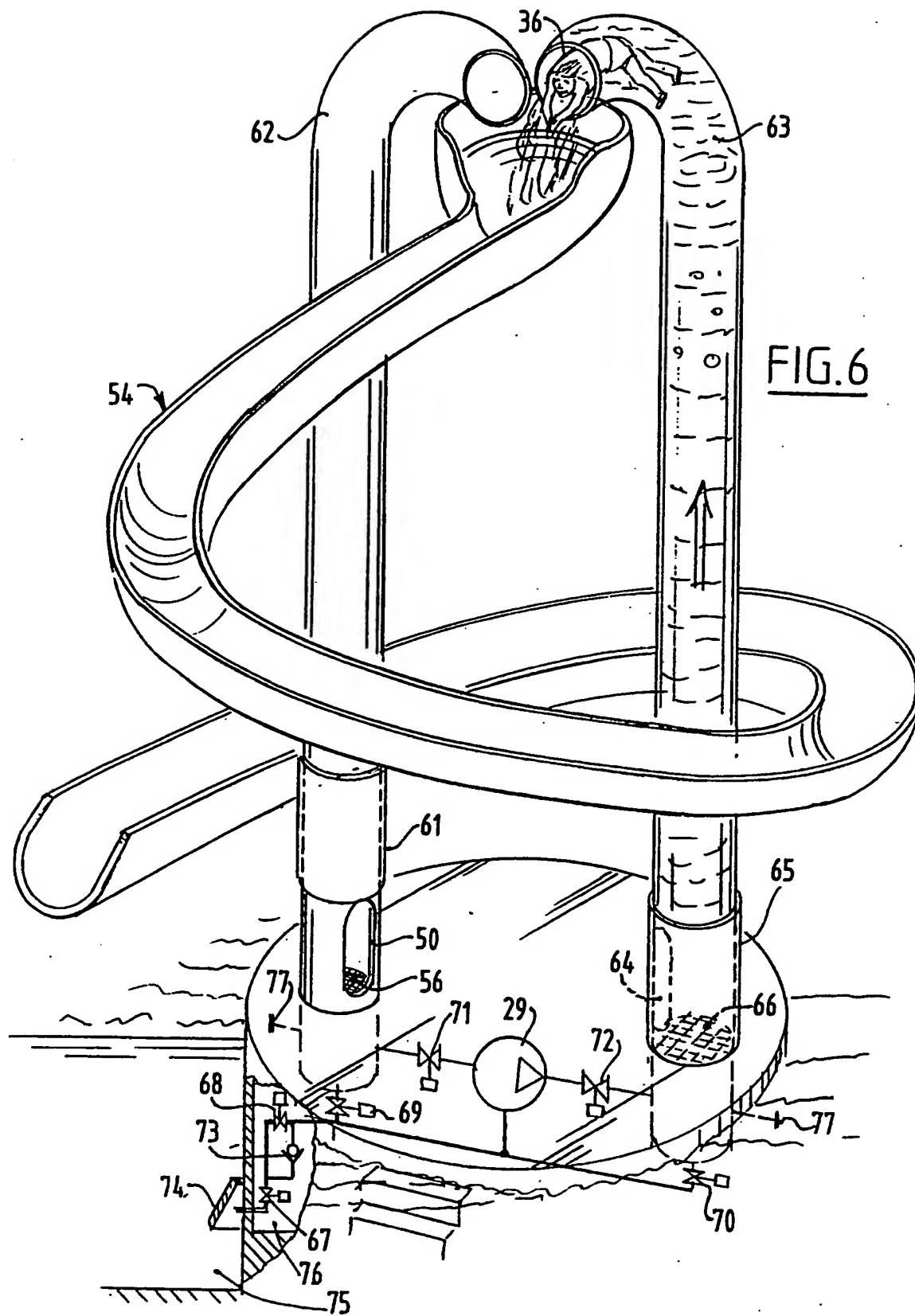
FIG. 4



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INTERNATIONAL SEARCH REPORT

International Application No

PCT/NL 91/00268

I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all)⁶

According to International Patent Classification (IPC) or to both National Classifications and IPC

Int.Cl. 5 A63G21/18; B65G51/00

II. FIELDS SEARCHED

Minimum Documentation Searched⁷

Classification System	Classification Symbols
Int.Cl. 5	A63G ; B65G ; E04H

Documentation Searched other than Minimum Documentation
to the Extent that such Documents are Included in the Fields Searched⁸

III. DOCUMENTS CONSIDERED TO BE RELEVANT⁹

Category ¹⁰	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
A	DE,A,2 200 789 (BOES) 19 July 1973 see the whole document	1,17,20
A	US,A,2 778 692 (MAKINSON) 22 January 1957 see column 2, line 3 - line 60; figures	1,4-7,9, 17
A	US,A,4 046 996 (WILLIAMS) 6 September 1977 see the whole document	1,4,5,17
A	US,A,4 805 897 (DUBETA) 21 February 1989 cited in the application see figure 5	1

¹⁰ Special categories of cited documents:

- "A" document defining the general state of the art which is not considered to be of particular relevance
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IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
26 MARCH 1992	16.04.92
International Searching Authority EUROPEAN PATENT OFFICE	Signature of Authorized Officer BAERT F. 

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON INTERNATIONAL PATENT APPLICATION NO. NL 9100268 SA 54858

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information. 26/03/92

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE-A-2200789	19-07-73	None	
US-A-2778692		None	
US-A-4046996	06-09-77	None	
US-A-4805897	21-02-89	None	